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| EXAMINER | |
|---|---|
| RIDER, JUSTIN W | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/811,208 | PS ET AL. | |
| | Examiner | Art Unit | |
| | JUSTIN W. RIDER | 2626 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 January 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) *6 and 17* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-16 and 18-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## *Response to Amendment*

1. In response to the Office Action mailed 25 September 2007, applicant submitted a response filed 28 January 2008, in which the applicant amended claims 1-2, 5, 9, 22, 27 and 30 without adding new matter. Applicant cancelled claims 6 and 17 and added claims 33-34.

## *Response to Arguments*

2. Applicant's arguments with respect to claims 1-2, 5, 9, 22, 37 and 30 have been considered but are moot in view of the new ground(s) of rejection.

## *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3-5, 7, 22-29 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Strauss et al. (US 2002/0116186 A1)** referred to as **Strauss** hereinafter in view of **Tzirkel-Hancock (US Patent No. 6,275,795)** referred to as **Tzirkel-Hancock** hereinafter.

*Claims 1 and 27*: **Strauss** discloses a speech signal data processing method, comprising:

i. framing the speech data (Fig. 17 shows where the speech data processing is taking place on a frame of data, it is therefore inherently recited that the input speech data is framed.); and

ii. determining a presence of impulsive distortion (e.g. spikes above a certain average level, also considered noise by the Examiner) in the speech data from root mean square (RMS) (p. 14, paragraph [0142], *'...when the root mean squared energy of $S_{in}$ (RMS) falls below -36dBM indicating no tone signals.'* Also, Abstract, *'detect whether a threshold amount of energy is present...'*) and zero crossing rate (ZCR) (Fig. 14D; p. 15, paragraph [0154]) values of the speech data.

However, **Strauss** fails to but **Tzirkel-Hancock** does specifically disclose wherein a zero crossing rate (ZCR) value indicates a rate at which a speech signal switches across its mean value in a frame (Figure 7; col. 11, lines 40-62 disclose the determination and relevance of ZCR values in relation to noise and voiced/unvoiced speech frames.).

All of the component parts are known in both **Strauss** and **Tzirkel-Hancock** for speech signal processing. The only difference is the specific combination of the "old elements" into a single system as taught above.

Therefore, it would have been obvious to one possessing ordinary skill in the art at the time of invention to include the teachings of **Tzirkel-Hancock** in the system of **Strauss** because in an analogous art **Strauss** is determining both RMS values as well as zero crossings with respect to speech signals. With this data already provided by **Strauss**, it would be a simple, well-known calculation to determine ZCR values and apply them using a predetermined threshold in the manner as disclosed in **Tzirkel-Hancock**, as ZCR value determination is in no way dependent upon the previously disclosed steps in the disclosure of **Strauss**. Speech/noise determination based on ZCR values taken from an input signal in combination with the

speech/noise determination and signal processing methods of **Strauss** would, therefore provide consistent, predictable results aligned with those well known in the state of the art.

*Claims 22 and 33*: **Strauss** discloses a speech signal data processing method (and as per claim 1 in the case of claim 33), comprising determining a presence of impulsive distortion (e.g. spikes above a certain average level, also considered noise by the Examiner) in the speech data from root mean square (RMS) (p. 14, paragraph [0142], *'...when the root mean squared energy of $S_{in}$ (RMS) falls below -36dBM indicating no tone signals.'* Also, Abstract, *'detect whether a threshold amount of energy is present...'*) and zero crossing rate (ZCR) (Fig. 14D; p. 15, paragraph [0154]) values of the speech data.

However, **Strauss** fails to but **Tzirkel-Hancock** does specifically disclose wherein a zero crossing rate (ZCR) value is low for speech signals (Figure 7; col. 11, lines 40-62 disclose the determination and relevance of ZCR values in relation to noise and voiced/unvoiced speech frames.).

All of the component parts are known in both **Strauss** and **Tzirkel-Hancock** for speech signal processing. The only difference is the specific combination of the "old elements" into a single system as taught above.

Therefore, it would have been obvious to one possessing ordinary skill in the art at the time of invention to include the teachings of **Tzirkel-Hancock** in the system of **Strauss** because in an analogous art **Strauss** is determining both RMS values as well as zero crossings with respect to speech signals. With this data already provided by **Strauss**, it would be a simple, well-known calculation to determine ZCR values and apply them using a predetermined threshold in the manner as disclosed in **Tzirkel-Hancock**, as ZCR value determination is in no

way dependent upon the previously disclosed steps in the disclosure of **Strauss**. Speech/noise determination based on ZCR values taken from an input signal in combination with the speech/noise determination and signal processing methods of **Strauss** would, therefore provide consistent, predictable results aligned with those well-known in the state of the art.

*Claim 23*: **Strauss** discloses a speech signal data processing article of manufacture as per claims 22 above, further comprising framing the speech data (Fig. 17 shows where the speech data processing is taking place on a frame of data, it is therefore inherently recited that the input speech data is framed.).

*Claims 3, 24 and 28*: **Strauss** discloses a speech signal data processing method as per claims 1, 22 and 29 above, wherein determining the presence of impulsive distortion comprises identifying a low ZCR (p. 15, paragraph [0154], *'Speech tends to have a high number of zero crossings.'* [Inversely, noisy or distorted impulses will have a low ZCR.]) value and a high RMS (p. 14, paragraph [0142], *'...when the root mean squared energy of Sin (RMS) falls below -36dBM indicating no tone signals.'*) value (p. 3, paragraph [0050] recites wherein noise and high energy flags are set based on certain threshold values of RMS energy and zero crossing rates.).

*Claim 4, 25 and 29*: **Strauss** discloses a speech signal data processing method as per claims 1, 22 and 29 above, wherein determining the presence of impulsive distortion comprises identifying a high ZCR (p. 15, paragraph [0154], *'Speech tends to have a high number of zero crossings.'*) value and a high RMS (p. 14, paragraph [0142], *'...when the root mean squared energy of Sin (RMS) falls below -36dBM indicating no tone signals.'*) value (p. 3, paragraph [0050] recites wherein noise and high energy flags are set based on certain threshold values of RMS energy and zero crossing rates.).

*Claim 5*: **Strauss** discloses a speech signal data processing method as per claim 1, wherein the RMS value is computed for a frame of the speech data and indicates a strength of a speech signal in the frame (p. 14, paragraph [0142], *'...when the root mean squared energy of Sin (RMS) falls below -36dBM indicating no tone signals.'*).

*Claims 7, 26 and 31*: **Strauss** discloses a speech signal data processing method as per claims 1 22 and 27 above, further comprising determining the presence of impulsive distortion in the speech data from a sample energy value of a speech sample from the speech data (Abstract, *'detect whether a threshold amount of energy is present to determine whether an energy flag should be set, and detect whether instantaneous energy is present to determine whether an instantaneous energy flag should be set. Utilizing a combination of the noise, zero crossing, energy, and instantaneous energy flags the integrated voice activation detector determines whether voice is present.'*).

*Claim 32*: **Strauss** discloses a speech signal data processing method as per claim 31 above, wherein the spike detection unit determines a presence of impulsive distortion in the speech sample in response to the sample energy value and the sample energy values of speech samples neighboring the speech sample (It is inherent that since the definition of an impulsive distortion is an unwanted 'spike' in an input signal that there would necessarily be a large energy disparity between the affected samples and the surrounding 'neighbor' samples; this difference would noticeably show signs of impulsive distortion.).

*Claim 34*: The limitation of claim 34 is similar in scope and content to the rejections of claims 1 and 27 above, and so therefore are rejected under the same rationale.

5. Claims 2 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Strauss et al. (US 2002/0116186 A1)** referred to as **Strauss** hereinafter in view of **deVries (US Patent No. 6,289,309)** referred to as **deVries** hereinafter.

*Claims 2 and 30*: **Strauss** discloses a speech signal data processing method as per claims 1 and 27 above, further comprising framing the speech data (Fig. 17 shows where the speech data processing is taking place on a frame of data, it is therefore inherently recited that the input speech data is framed.).

However, **Strauss** fails to but **deVries** does specifically disclose overlapping frames of data, specifically disclosing the use of the well-known Hamming windows in order to efficiently combine windows of speech data (col. 3, lines 27-39).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **deVries** in the method of **Strauss** because it provides an effective way of windowing and framing an input sound signal in order to enhance speech by means of differentiating between speech and noise (Abstract; col. 1, Background).

6. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Beerends et al. (US 2004/0078197 A1)** referred to as **Beerends** hereinafter in view of **deVries**.

*Claim 9*: **Beerends** discloses a method for processing speech data, comprising the following steps:

i. performing speech quality measurement on the speech data (Abstract, *'measurements methods and devices for predicting perceptual quality of speech signals... '*); and

ii. determining a presence of impulsive distortion in the speech data p. 1, paragraph [0004], *'It is this behaviour of the reciprocal value of such a power related parameter, that can be used to adapt the distortion calculation in such a manner that a much better prediction of the subjective quality of systems under test is possible.'*).

However, **Strauss** fails to but **deVries** does specifically disclose overlapping frames of data, specifically disclosing the use of the well-known Hamming windows in order to efficiently combine windows of speech data (col. 3, lines 27-39).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **deVries** in the method of **Beerends** and **Strauss** because it provides an effective way of windowing and framing an input sound signal in order to enhance speech by means of differentiating between speech and noise (Abstract; col. 1, Background).

*Claim 10*: **Beerends** discloses a method for processing speech data, further comprising:

i. performing level alignment and filtering (p. 2, paragraph [0028], *'the pre-processing including power level scaling,'*);

ii. performing time alignment (p. 2, paragraph [0028], *'...and time alignment operations.'*);

iii. performing auditory processing (p. 2, paragraph [0028], *'The further processing step implies mapping of the (degraded) output signal Y(t) and the reference signal X(t) on representation signals R(Y) and R(X) according to a psycho-physical perception model of the human auditory system.'*);

iv. performing disturbance processing (p. 2, paragraph [0028], *'During the combined signal processing step a differential or disturbance signal D is determined by the differentiating means 15 from said representation signals,'*); and

v. performing cognitive modeling (p. 2, paragraph [0028], *'which is then processed by modeling means 16 in accordance with a cognitive model,'*).

7. Claims 11-13, 16 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Beerends,** in view of **deVries** and in further view of **Strauss**.

*Claim 11*: **Beerends,** in view of **deVries** discloses a method for signal quality enhancement as per claim 9 above, however failing to, but **Strauss** does disclose determining the presence of impulsive distortion in the speech data from a sample energy value of a speech sample from the speech data (Abstract, *'detect whether a threshold amount of energy is present to determine whether an energy flag should be set, and detect whether instantaneous energy is present to determine whether an instantaneous energy flag should be set. Utilizing a combination of the noise, zero crossing, energy, and instantaneous energy flags the integrated voice activation detector determines whether voice is present.'*).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Strauss** in the methods of **Beerends,** in view of **deVries** because it provides an advantageous recitation of determining the presence of instantaneous signal distortion and taking appropriate measures to eliminate such distortions that can severely degrade signal quality.

*Claim 12*: **Beerends,** in view of **deVries** discloses a method for signal quality enhancement as per claim 11 above, however failing to, but **Strauss** does disclose a speech signal processing method as per claim 31 above, wherein the spike detection unit determines a presence of impulsive distortion in the speech sample in response to the sample energy value and the sample energy values of speech samples neighboring the speech sample (It is inherent that since the definition of an impulsive distortion is an unwanted 'spike' in an input signal that there would necessarily be a large energy disparity between the affected samples and the surrounding 'neighbor' samples; this difference would noticeably show signs of impulsive distortion.) to determine whether there is a difference greater than a predetermined threshold value (p. 10, paragraph [0106]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **Strauss** in the methods of **Beerends,** in view of **deVries** because of the same reasons outlined in the rejection of claim 11 above.

*Claim 13*: **Beerends**, in view of **Strauss** discloses a speech signal processing method as per claim 11 above, however failing to, but **deVries** does, specifically disclose using Teager energy operations to determine signal sample energy (col. 7, line65 - col. 8, line 5).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to include the teachings of **deVries** in the method of **Beerends** and **Strauss** because it provides an effective way of windowing and framing an input sound signal in order to enhance speech by means of differentiating between speech and noise (Abstract; col. 1, Background). Teager energy operations were originally derived as a mode to demonstrate the importance of energy characteristics for analysis and modeling of speech signals on a non-linear basis. The

Teager energy operations are historically used to implement the idea of the importance of energy utilization in speech signal processing. It has proven particularly useful in stress (e.g. spikes and impulsive distortions) analysis in speech signals.

*Claims 16 and 18-21*: Claims 16 and 18-21 are similar in scope and content to that of claims 1-5, respectively and so therefore are rejected under the same rationale.

8. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Beerends**.

*Claim 14*: **Beerends** discloses a method as per claim 9 above wherein RMS values of samples and frames are compared against threshold values in order to determine the presence of impulsive distortion or spikes in an input signal. However, **Beerends** fails to disclose wherein every other frame is compared in order to make a distortion determination. The Examiner is asserting that such a step would be a suitably obvious choice of design for determining energy levels for a given frame. The use of overlapping frames is a use that is commonly known to those possessing ordinary skill in the art, and so the measurement of every other frame would be a known obvious step in order to avoid redundant overlapping measurements and to obtain results from totally independent frames.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to take energy values from every other frame (e.g. k-4, k-2, k, k+2 and k+4) so as to take accurate independent energy measurements and to avoid redundant information, which would adversely affect the outcome.

*Claim 15*: Claim 15 is similar in scope and content to that of claim 14 above and so therefore is rejected under the same rationale.

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUSTIN W. RIDER whose telephone number is (571)270-1068. The examiner can normally be reached on Monday - Friday 8:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Hudspeth can be reached on (571) 272-7843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Justin W Rider/
Examiner, Art Unit 2626
30 April 2008

/David R Hudspeth/

Supervisory Patent Examiner, Art Unit 2626